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(54) Abstract Title
A radiation shield for a mobile telephone

(57) A cellular radio telephone 10 has a radiation shield 8 which may comprise a cover flap 18 (fig.1), moveable between a closed position covering all or part of the keypad 3 and an open position in which the flap provides a barrier between the user's head and the antenna 2. The speaker 6 of the portable phone may be located on the radiation shield. The shield may otherwise comprise a pull-out screen 28, slidable between an open position in which the screen provides a barrier between the user's head and the antenna, and a closed position in which the screen is retractable into the housing 7 of the radiotelephone. The screen can be automatically manoeuvred into the open or closed positions in response to the pressing of a button. The screen, when in the open position, can extend into the interior of the telephone in order to provide a barrier between the user's head and transmitting components within the housing.

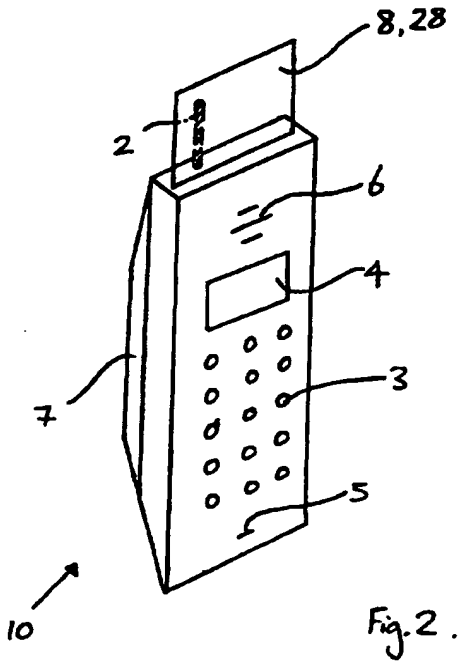

Fig.2.

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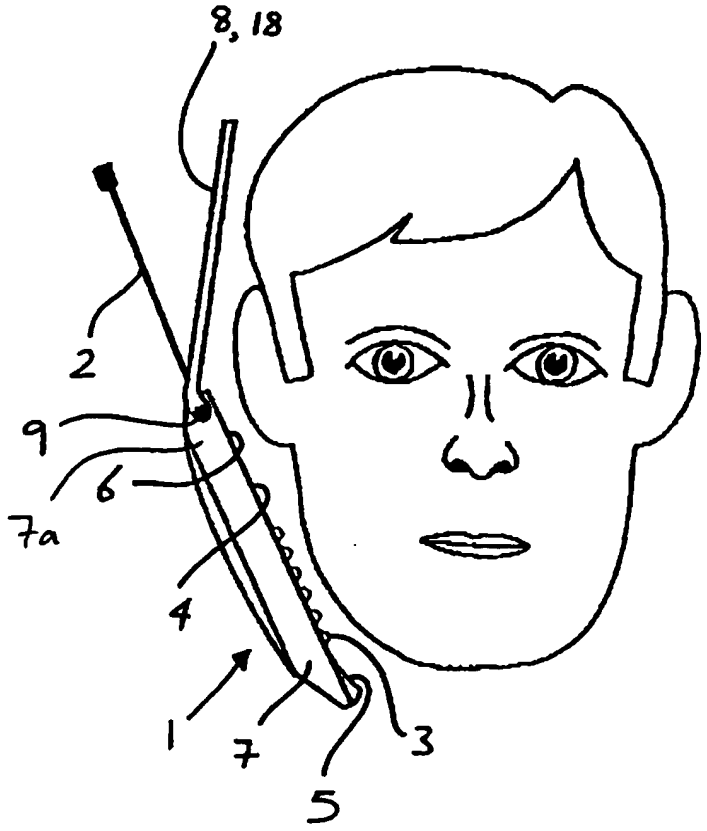

Fig. 1.

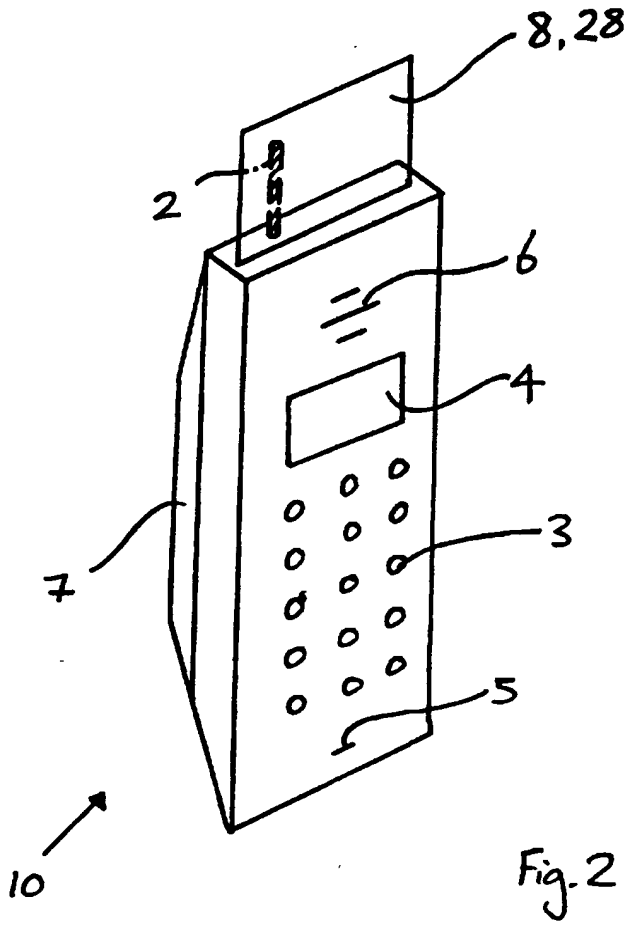

Fig. 2.

A Cellular Radio Telephone

The present invention relates to a cellular radio telephone comprising a radiation shield.

Cellular technology operates by means of electromagnetic radiation signals of a particular range of frequencies within the radiowave band of the electromagnetic frequency spectrum, which ranges from 3kHz to 300GHz. At the very upper end of this band of radiofrequencies, from 300MHz to 300GHz (Foster and Guy, 1986) are the band of ultra high frequencies known as microwaves, and cellular technology operates using frequencies of 824MHz to 894mhz (King, 1983), which fall into the microwave region of the frequency spectrum as well as the overall category of radiowaves, under this definition. It should be noted by the reader that the electromagnetic radiation signals emitted from cellular radio telephones will henceforth be referred to as radiowave signals or radiofrequency radiation.

These radiowave signals are transmitted through the atmosphere and provide the basis for the operation of cellular network communications systems. Cellular networks consist of individual cellular radio telephones which are wire-free and portable, a regional network of overlapping cell sites (each comprising antennae or 'base station transceivers', and the area it services), controlled from a cellular switching computer (or Mobile Telephone Exchange - MTX). A cellular telephone transmits and receives radiowave signals to and from the nearest cell site.

Because the intensity of electromagnetic waves is greatest close to the source, declining rapidly with distance from this source, and because a cellular radio

telephone must be able to transmit radiowaves over considerable distances to enable the telephone's signal to reach the nearest cell, the telephone must produce a high intensity radiofrequency signal. However, because this high intensity radiowave signal is transmitted from the antenna of the cellular radio telephone, which is positioned in close proximity to the head of a user during use of the cellular radio telephone, there has been considerable concern over the safety of such cellular radio telephones.

Thermal effects, such as brain tissue destruction or damage, which could result from the localised heating of brain tissue caused by irradiation with high intensity radiowaves, are of concern, as are low-level biological effects caused by exposure to electromagnetic fields, such as impaired brain function, behavioural modifications, immunological effects, headaches, irritability and fatigue. There is also a concern that exposure could increase the risk of cancer or encourage tumour formation. The exact health risks associated with the use of cellular radio telephones are not entirely certain at the present time, and in particular there is a lack of evidence relating to long-term use of such devices. It is likely, however, that any health risks are exacerbated with an increased duration of exposure, and thermal effects increased with the intensity of the radiation.

The aim of the present invention is to provide a cellular radio telephone which reduces the user's exposure to radiofrequency radiation whilst using the telephone.

A further aim of the present invention is to provide a cellular radio telephone which is safer for a user.

A further aim of the present invention is to provide a barrier between the radiowave transmitting antenna of a cellular radio telephone and a user's head.

A further aim of the present invention is to provide a barrier between the radiowave transmitting components of a cellular radio telephone and a user's head.

According to the present invention there is provided a cellular radio telephone, said cellular radio telephone comprising radiowave transmitting and receiving equipment including an antenna, a keypad, an electronic display, a microphone and a speaker, all contained within or arranged on a housing, characterised in that said housing includes a radiation shield.

Preferably, said radiation shield is permanently attached to said cellular radio telephone, and preferably said radiation shield comprises a cover flap. Said cover flap is preferably moveable between an open position and a closed position. Preferably the cover flap is openable to provide a barrier between the user's head and the antenna when the cover flap is in the open position. Preferably, said cover flap opens in an upwards direction when the cellular radio telephone is held in an upright position. Preferably said radiation shield covers said keypad and provides protection for said keypad when said radiation shield is in the closed position. Said radiation shield may be removable.

Preferably, said radiation shield comprises a pull-out screen, which is moveable between an open position and a closed position. Preferably, the pull-out screen is openable to provide a barrier between the user's head and the antenna when the pull-out screen is in the open position and the telephone is in use.

Preferably, said pull-out screen is retractable into the housing of said cellular radio telephone. When said pull-out screen is in the open position, said pull-out screen may extend substantially into the interior of the cellular radio telephone, in order that said radiation shield additionally provides a barrier between the user's head and other transmitting components arranged within the housing.

Said radiation shield may be made from any material with an electrically conducting layer. Preferably, said radiation shield is made from plastic with an internal layer of aluminium. Said radiation shield may be made from plastic or rubber with an internal layer of another electrically conducting material, such as another metal such as magnesium, or carbon. Said radiation shield may be made from plastic or rubber with a reflective metallic coating. Said radiation shield may be made from carbon-impregnated plastic. Preferably, said radiation shield is electrically earthed into the telephone.

The present invention will now be described, by example only, with reference to the following drawings, of which:

figure 1 shows a side view of a first preferred embodiment of a cellular radio telephone with a radiation shield in the open position, according to the present invention;

figure 2 shows a perspective view of second preferred embodiment of a cellular radio telephone with a radiation shield in the open position, according to the present invention;

Referring to figure 1, a cellular radio telephone 1 comprises radiowave transmitting and receiving equipment including an antenna 2, a keypad 3, an electronic display 4, a microphone 5 and a speaker 6, all contained within or arranged on a housing 7, said housing 7 including a radiation shield 8. The radiation shield 8 is made from plastic with an internal aluminium layer, and provides a barrier to radiation by reflecting said radiation away from the user's head. Said radiation shield is electrically earthed into the telephone.

In this first preferred embodiment of a cellular radio telephone 1 according to the present invention, said radiation shield 8 is permanently attached to said cellular radio telephone 1, and said radiation shield 8 comprises a cover flap 18. Said cover flap 18 is movable by a user between an open position, as shown in figure 1, in which the cover flap 18 provides a radiation barrier between the user's head and the antenna 2, and a closed position, in which said cover flap 18 covers said keypad 3 and provides protection for the keypad 3. Note that in alternative embodiments, the cover flap does not extend over all or part of the keypad 3, thus allowing access to the keypad 3. The cover flap 18 is attached to the housing 7 by means of a hinge 9 at an upper end 7a of the housing 7, and is openable in an upwards direction when the cellular radio telephone 1 is held in an upright position. In this preferred embodiment, the cover flap 18 must be opened by a user in order to make or receive a telephone call. This ensures that the radiation shield 8, 18 is in the open position, and is thus protecting the user from radiation, whenever the user's head is in close proximity to the operational telephone transmission components. In an alternative embodiment, the telephone may be used without the cover flap 18 being in the open position, and thus the use of the radiation shield 8, 18 is optional for the user.

In an alternative embodiment, said radiation shield is removable. In this embodiment, said radiation shield comprises a cover flap as in the first preferred embodiment, but in this case the cover flap is releasably attachable to the housing of the telephone.

In a further alternative embodiment, the speaker 6 of the cellular radio telephone is located on the cover flap 18.

Referring now to figure 2, this shows a second preferred embodiment of a cellular radio telephone 10 according to the present invention, wherein said radiation shield 8 comprises a pull-out screen 28, which is movable by a user between an open position, in which the screen 28 provides a radiation barrier between the user's head and the antenna 2, and a closed position, in which said pull-out screen 28 retracts into the housing 7 of said cellular radio telephone 10. In this embodiment, said pull-out screen 28 extends substantially into the interior of the cellular radio telephone 10 when the screen 28 is in the open position, in order that said radiation shield 8 additionally provides a barrier between the user's head and other transmitting components arranged within the housing. In an alternative embodiment, the screen 28 is extended outside the housing 7 along its full length when in the open position.

In a further embodiment, the pull-out screen 28 is automated, and is automatically manoeuvred into the open position when a user makes or receives a telephone call. The screen 28 is then automatically manoeuvred into the closed position when the user ends the telephone call. In a further embodiment, the automated pull-out screen 28 is operable by a user in response to the pressing of a button, in order that use of the radiation shield 8, 28 is optional for the user.

It will be obvious to the reader that various modifications are possible within the scope of the present invention, and that the above-described embodiments are examples only. For example, said radiation shield may be made from any material with an electrically conducting layer, and the electrically conducting layer may be a layer of any metal or carbon. The electrically conducting layer may be internal or an external layer, or an impregnated layer. The radiation shield may be any suitable shape, and in particular, the shield may be curved. If the shield is made concave in relation to the antenna, this would also have the effect of improving the reception of incoming signals to the cellular radio telephone.

Claims

1. A cellular radio telephone, said cellular radio telephone comprising radiowave transmitting and receiving equipment including an antenna, a keypad, an electronic display, a microphone and a speaker, all contained within or arranged on a housing, characterised in that said housing includes a radiation shield.

2. A cellular radio telephone according to claim 1, characterised in that said radiation shield comprises a cover flap, moveable between a closed position, in which said cover flap is arranged adjacent to the housing, and an open position in which said cover flap provides a barrier between the user's head and the antenna.

3. A cellular radio telephone according to claim 2, characterised in that said cover flap covers said keypad and provides protection for all or part of said keypad when said cover flap is in the closed position.

4. A cellular radio telephone according to claim 1, characterised in that the speaker 6 of the cellular radio telephone is located on the radiation shield.

5. A cellular radio telephone according to claim 1, characterised in that said radiation shield is permanently attached to said cellular radio telephone.

6. A cellular radio telephone according to claim 1, characterised in that said radiation shield is releasably attachable to said cellular radio telephone.

7. A cellular radio telephone according to claim 1, characterised in that said radiation shield comprises a pull-out screen, slidable between an open position in which said pull-out screen provides a barrier between the user's head and the antenna, and a closed position, in which the pull-out screen is retractable into the housing of said cellular radio telephone.

8. A cellular radio telephone according to claim 7, characterised in that when said pull-out screen is in the open position, said pull-out screen extends substantially into the interior of the cellular radio telephone, in order that said radiation shield additionally provides a barrier between the user's head and the transmitting components arranged within the housing.

9. A cellular radio telephone according to claims 7 or 8, characterised in that the pull-out screen is automated, and is automatically manoeuvred into the open position when a user makes or receives a telephone call, and automatically manoeuvred into the closed position when the user ends the telephone call.

10. A cellular radio telephone according to claims 7 or 8, characterised in that the pull-out screen is automated, and is operable by a user to be automatically manoeuvred into the open or closed positions in response to the pressing of a button by the user.

11. A cellular radio telephone according to any preceding claim, characterised in that said radiation shield is made from any material with an electrically conducting layer, such as plastic or rubber with a metallic or carbon layer.

12. A cellular radio telephone according to any preceding claim, characterised in that said radiation shield is made from plastic with an aluminium or magnesium layer.

13. A cellular radio telephone according to any preceding claim, characterised in that said radiation shield is made from carbon-impregnated plastic.

The Patent Office

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Claims searched:	1-13	**Date of search:**	5 May 1998

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.P): H4J (JK), H4L (LECX)

Int Cl (Ed.6): H01Q: 1/24, 1/27; H04B: 1/38; H04M: 1/02

Other: Online:- WPI, JAPIO, IFIPAT

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X	GB 2302474 A	(WILSON) - see for example fig.s 2,5 and p.8, lines 30 - 35.	1,5,7,8,11
X	WO 94/28595 A1	(THIEL, O'KEEFE) - see particularly p.8, lines 14-19	At least 1,2,5,7
X	WO 94/21054 A1	(WILSON) - see p. 7, second paragraph.	1,2,3,5,6, 11
X	WO 94/18817 A1	(INCREA OY)	1,2,4,5,7, 11,13
X	US 5493704	(GRANGEAT et al.) - see figure.	At least 1,4,5
X	US 5335366	(DANIELS) - see particularly fig.s 1 and 4	1,6

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.